

REBUTTAL TESTIMONY OF
ERIC H. BELL, P.E.
ON BEHALF OF
DOMINION ENERGY SOUTH CAROLINA, INC.
DOCKET NO. 2021-88-E

1 **Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS, AND**
2 **OCCUPATION.**

3 A. My name is Eric H. Bell. My business address is 220 Operation Way, Cayce,
4 South Carolina. I am employed by Dominion Energy Services, Inc. as the Manager-
5 Electric Market Operations for Dominion Energy South Carolina, Inc. (“DESC” or
6 the “Company”).
7

8 **Q. HAVE YOU PREVIOUSLY TESTIFIED IN THIS PROCEEDING?**

9 A. Yes, I previously submitted direct testimony in this matter on behalf of
10 DESC.
11

12 **Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?**

13 A. I am addressing certain portions of the testimony of Edward Burgess, which
14 was submitted on behalf of the Carolinas Clean Energy Business Association
15 (“CCEBA”) and Kenneth Sercy, which was submitted on behalf of the South

1 Carolina Coastal Conservation League and the Southern Alliance for Clean Energy
2 (“SCCCL/SACE”). I also am responding to certain suggestions and points made by
3 Brian Horii, which was submitted on behalf of the South Carolina Office of
4 Regulatory Staff (“ORS”). The lack of a response to any of the specific assertions
5 made by these witnesses does not constitute the Company’s agreement to those
6 assertions.

7
8 **RESPONSE TO TESTIMONY OF EDWARD BURGESS**

9 **Q. BEFORE YOU RESPOND TO SPECIFIC ASSERTIONS BY WITNESS**
10 **BURGESS, PLEASE ADVISE THE PUBLIC SERVICE COMMISSION OF**
11 **SOUTH CAROLINA (“COMMISSION”) WHO PREPARED THE**
12 **VARIABLE INTEGRATION COST (“VIC”) STUDY SUBMITTED IN THIS**
13 **PROCEEDING?**

14 **A.** The VIC study was prepared by Guidehouse, which is an independent energy
15 consultant engaged by the Company to prepare the study. The study was not
16 prepared by DESC, but by Guidehouse based on the Company’s operating
17 characteristics and factors. Witness Burgess repeatedly characterizes the study as a
18 DESC study. While the Company did engage Guidehouse to perform a study in the
19 general nature of the study that the Commission will be conducting pursuant to the
20 statutory mandate, the study was not performed by DESC. The study was based on
21 Company data and information that was provided to and used by Guidehouse, and

1 which has been made available to all other parties in this proceeding. It also is
2 important to note that the VIC study performed by Guidehouse is different than the
3 avoided cost study, which was performed by the Company.
4

5 **Q. WHAT IS YOUR RESPONSE TO WITNESS BURGESS'S STATEMENT**
6 **THAT THE GUIDEHOUSE MODEL USES GROSSLY INACCURATE**
7 **ASSUMPTIONS THAT ARE NOT REFLECTIVE OF DESC'S OPERATING**
8 **PRACTICES?**

9 A. I disagree with his characterization of the study. The information provided to
10 and used by Guidehouse for the Company's operating practices is based on and
11 entirely consistent with the Company's historical practices. However, given the
12 substantial increase in the amount of solar QF MW on the DESC system, it is
13 necessary to make projections and estimates to evaluate the impact of that additional
14 solar on system reliability. While it is true that Guidehouse identified additional
15 operating reserves higher than DESC has historically used, the study establishes that
16 additional reserves are needed due to the intermittent nature of solar energy
17 generation and the increasing levels of solar penetration into the DESC system.
18 DESC is evaluating these study results to determine the level of additional reserves
19 necessary to provide adequate levels of reliability. But it is a distortion of the study
20 to characterize the projections as based on "grossly inaccurate assumptions."
21

1 **Q. SHOULD DESC DETERMINE THE VARIABLE INTEGRATION CHARGE**
2 **(“VIC”) BASED ON ACTUAL COSTS DUE TO INTEGRATION AS**
3 **WITNESS BURGESS SUGGESTS?**

4 A. No. The actual costs to which he refers are already embedded in fuel and
5 operating costs and, thus, in the fuel recovery charge. These costs result from
6 operating dozens of generating units and purchasing power over months and years,
7 and are due to many interdependent and related, but not easily distinguishable,
8 factors and constraints. Based on observation and experience over time, DESC has
9 determined that an increasing amount of these costs arise from avoided cost solar
10 generation resources. Consequently, these costs must be offset by a charge to the
11 suppliers of intermittent generation.

12 Production cost model simulations, specifically the VIC studies, are the most
13 reasonable method to ascertain the cost impact of intermittent resources and the
14 impact to customer bills. The Company understands that the Commission never
15 intended for the true-up to be based on a post-analysis determination of historical
16 costs, but through an integration charge study like that submitted by Guidehouse in
17 this proceeding. Production cost modeling is used regularly in Commission
18 proceedings for calculating many costs, as evidenced by the fact that avoided cost
19 proceedings at the Commission relies on this type of analysis. The VIC is no
20 different and Witness Burgess never explains why it should be different. Contrary
21 to the characterization made by Witness Burgess, production cost modeling and

1 simulations are extremely reliable for determining the cost impact of system
2 changes because they consider the many and constantly varying characteristics of
3 the Company's system and solar production.

4 In conclusion, accurately identifying the VIC in historical data is not
5 practical. The cost of carrying additional reserves for variable solar resources is
6 significant, should be recovered from the applicable PPAs, but is a small percentage
7 of annual fuel costs. The accumulated VIC charge is small relative to total fuel costs
8 and is embedded in total fuel costs. Attempting to separate the resulting costs from
9 the many other factors that ultimately drive total fuel costs would not lead to a more
10 accurate assessment of past or future costs. Therefore, DESC recommends that the
11 Commission continue to rely on production cost modeling and simulations to assess
12 the VIC.

13
14 **Q. DID THE COMPANY PROVIDE CCEBA WITH INFORMATION ABOUT**
15 **ITS HISTORICAL RESERVE LEVELS?**

16 A. Yes, it did. Specifically, CCEBA and the other intervenors were provided
17 with this information on a timely basis in response to discovery requests.

1 **Q. DOES THE DATA THAT DESC PROVIDED ABOUT OPERATING**
2 **RESERVE HISTORY PROVE THAT A VIC IS NOT NEEDED AS WITNESS**
3 **BURGESS SUGGESTS?**

4 A. No. DESC provided hourly data for recent years that quantifies the reserves
5 that were available, but the data do not explain the reasons for having more or less
6 reserves. In fact, operating reserves to cover unexpected drops in solar output has
7 become a dominant factor only recently due to the level of solar that has been
8 connected to the Company's system.

9 Contrary to what Witness Burgess suggests, it is a normal outcome of a
10 reliability-constrained, economic unit commitment to have reserves that are higher
11 than the minimum. In fact, the reserve requirement by its very nature is a minimum
12 requirement and actual reserves will almost always be higher. Reserve planning is
13 impacted by the solar forecast, contingency reserve requirements, regulation
14 requirements, and the hourly load forecast. The most constrained hours set the basis
15 for the commitment of firm resources. Most hours of the day are not reserve limited
16 and other factors determine the unit commitment at those times. A main factor is
17 economic dispatch, which impacts reserve levels in hours that are not reserve
18 limited. Baseload and intermediate units have operating costs, minimum run time,
19 and minimum down time requirements that determine unit commitment between the
20 reliability constrained hours of the day and week. Historical data is embedded with
21 the effects of varying demand levels, low natural gas prices, high natural gas prices,

1 varying energy market prices, plant availability, and increasing solar
2 interconnections. All of these factors are interacting in a way that is too complex to
3 make the simple statement that Witness Burgess is relying upon as the basis of his
4 argument—which is why a study using projections is essential and why his casual
5 observation of the historical data is not a reasonable or reliable substitute.

6 The production cost model identifies the hours with the conditions for a
7 reserve constraint and adjust the unit commitment and costs to meet that constraint.
8 In actual practice, a few hours in each week will influence the unit commitment that
9 is responsible for the actual reserves for all hours of each week and month. The
10 other days and the reserves for those other hours in a week and month will have
11 reserve levels that are a byproduct of the most limiting hours and often higher than
12 the minimum. Operating reserves for solar and contingency reserves are the limiting
13 factor in the unit commitment in a minority of hours of the month and the level of
14 operating reserves cannot be determined just based on examining the average level
15 of reserves over any time period.

16
17 **Q. SHOULD THE COMMISSION DRAW A CONCLUSION FROM THE**
18 **OPERATING DATA AS WITNESS BURGESS HAS?**

19 **A.** No. As stated above, the historical operating data does not provide a basis
20 for calculating the VIC.
21

1 **Q. WHAT IS YOUR RESPONSE TO WITNESS BURGESS'S ASSERTION**
2 **REGARDING THE INCLUSION OF 250 MW RESERVES IN THE**
3 **BASELINE SCENARIO BEING BELOW THE LEVEL OF RESERVES**
4 **TYPICALLY AVAILABLE ON THE DESC SYSTEM?**

5 A. That is true, but it misses the point. It is common practice for utilities to carry
6 more reserves than the required minimum. But for the reasons I have stated above,
7 that does not facilitate or resolve calculating the VIC.
8

9 **Q. WHAT IS YOUR RESPONSE TO WITNESS BURGESS'S ASSERTION**
10 **THAT THE COMPANY'S INCREMENTAL INTEGRATION COSTS ARE**
11 **ZERO "MOST OF THE TIME"?**

12 A. Witness Burgess's statement on page 15 of his Direct Testimony is irrelevant
13 because in the instances when additional reserves are needed, the costs of providing
14 those reserves are not zero but are \$1.80/MWh as calculated by Guidehouse. The
15 variable integration costs are well above zero because of the need to maintain
16 reserves for a product that, as I explained in my direct testimony, has fluctuating
17 output depending on weather, cloud cover, and time of day. No amount of hand
18 waving and diversion will ever remove that fact. It is well-known that an integration
19 cost exists and has been acknowledged by this Commission.
20

1 **Q. DO YOU AGREE WITH WITNESS BURGESS THAT ONE-HOUR SOLAR**
2 **FORECASTS WOULD REDUCE THE VIC?**

3 A. No. One hour notice will improve compliance with the BAL Standard for
4 balancing the load and generation but will not create any additional firm capability
5 that is needed to maintain reserves. Any reduction in operating reserve costs due to
6 the one-hour forecast is minimal on the DESC system due to the type resources
7 standing by on the DESC system and the high level of intermittent resources.
8 Maintaining reserves for an unplanned drop in solar requires actions and costs that
9 are well ahead of the one-hour timeframe. In most cases, slow start and baseload
10 units must be brought online overnight and ahead of the contingency to provide
11 additional reserves. These actions incur costs well before the one-hour forecast
12 could alleviate the need for firm units. Another factor is the need to reestablish
13 reserves after the drop regardless of whether or not the drop was forecast. While in
14 the process of reestablishing reserves, it is common for the output to drop again in
15 the following hour. This creates the need to again reestablish reserves. With slow
16 start and baseload units available, reestablishing reserves cannot be accomplished
17 in real-time and must be addressed day ahead. The most useful and cost beneficial
18 improvement in forecasting is day ahead. This is a known challenge for the weather
19 forecasting industry and will not magically improve in time to alleviate VIC costs.

1 **Q. WITNESS BURGESS SUGGESTS THAT THE COMPANY SHOULD HAVE**
2 **CONSIDERED INTRA-HOUR DISPATCH IMPROVEMENTS, SUCH AS A**
3 **REGIONAL IMBALANCE MARKET LIKE THE SOUTHEAST ENERGY**
4 **EXCHANGE MARKET (“SEEM”); WHAT IS YOUR RESPONSE?**

5 A. DESC has requested approval for the Combustion Turbine (“CT”)
6 Replacement Plan, which should improve efficiency and response of intra hour
7 resources. More dependable and efficient offline reserve assets, CTs allow for a
8 more efficient dispatch of the other units on the system. On the other hand, SEEM
9 provides non-firm resources, and purchases of those resources therefore will not
10 increase reserves or assist in maintaining reliable and predictable contingency
11 reserves. The savings from SEEM will be through incremental costs differences
12 between regulating assets on the DESC system and those that can be purchased from
13 other system in 15-minute increments.

14
15 **Q. ARE THE REQUIREMENTS OF THE ACT NO. 62 INDEPENDENT**
16 **INTEGRATION STUDY APPLICABLE TO THE GUIDEHOUSE VIC**
17 **STUDY?**

18 A. No. The Company believes that the Legislature’s intent as expressed in Act
19 No. 62 is for there to be a statewide study that consolidates independent studies
20 conducted in each Balancing Authority Area. This independent integration study
21 could identify the VICs, but more importantly, inform policy decisions for the best

1 approach to integrate additional renewable energy into the State's energy supply.
2 This is a call for a long-term renewable plan. Witness Burgess has taken a very
3 narrow view, which the Company believes distorts the statutory language. The
4 Guidehouse VIC study identified integration costs for the period of time impacting
5 this avoided cost docket and was never meant to replace the wider scope of the
6 independent study identified in law.
7

8 **Q. DID THE COMPANY PROVIDE ADEQUATE INFORMATION**
9 **REGARDING THE CALCULATION OF THE VIC BY GUIDEHOUSE?**

10 A. Yes. Contrary to Witness Burgess's suggestion, the Guidehouse study itself
11 is extremely detailed and provides a full explanation of the methods used. Moreover,
12 as I noted above, the Company provided all parties with the data and information
13 used by Guidehouse in preparing its study. In this context, I note Witness Horii's
14 statement on page 4, lines 16-22 of his prefiled direct testimony that the Company
15 was "reasonably transparent" because it "provided information and its filings and
16 data responses that allowed [him] to assess the reasonableness of its proposals, to
17 make important improvements to the assumptions, and follow those changes
18 through the models so that [he] could derive [his] recommended tariffs and PPA
19 rates." (My added emphasis to the quotation).

20 I further note that the basis of the VIC has been well-known since the 2019-
21 184-E Docket and has not materially changed from identifying the need for

1 additional operating reserves. The Company's position on reliability has not
2 changed and many stakeholders were involved during that proceeding. Furthermore,
3 the language from Act No. 62 that Witness Burgess cites also contemplates that
4 ORS will guide the format for the state sponsored renewable integration study.
5 Consequently, Act No. 62 does not set an additional standard for DESC regarding
6 stakeholder involvement in the avoided cost docket since the State's renewable
7 integration study has yet to be initiated. In the past, the Commission has been
8 exceptionally clear when an additional stakeholder process is needed, and it did not
9 impose such a requirement with respect to the Company's filings or submissions in
10 this matter.

11
12 **Q. COULD THE COMPANY USE A ONE-HOUR SOLAR FORECAST AS**
13 **WITNESS BURGESS SUGGESTS?**

14 A. Yes, the solar generators could provide a one-hour solar forecast for DESC
15 to use. I note that the Form Power Purchase Agreement ("Form PPA"), both in effect
16 and as proposed, requires solar generators to provide the Company with "an hourly
17 forecast of availability for each hour of the next day." Form PPA, § 6.1(b). I also
18 note that, to be usable, the solar generators must provide a reasonable and reliable
19 forecast that can be used by the Company in evaluating available and needed
20 resources. If an hourly forecast is not reliable or functional, it does not assist in
21 resolving the question of the required or available reserves.

1 In addition to the potential for a seller-supplied one-hour forecast, the
2 Company also could, at some additional cost, procure a solar generation forecast
3 that is updated 24 times per day. But this additional cost should be borne by the
4 solar generators—i.e., the sellers—since, as noted above, they are responsible for
5 supplying the forecast of each facility’s output.

6 In considering this issue, it also is important to remember that the Company
7 and its customers did not install the utility-scale solar generation that creates the
8 VIC. For this reason, neither the Company nor its customers should bear the
9 additional costs arising due to the VIC or the additional forecasting requested by the
10 utility-scale solar generation owners or their consultants.

11
12 **Q. SHOULD THE SOLAR SITE VARIABILITY METRIC (“SSVM”)**
13 **CALCULATION RELY ON FORECASTED OUTPUT AS A POINT OF**
14 **COMPARISON OR ACTUAL OUTPUT?**

15 A. DESC could update the SSVM requirement to include a forecasting
16 provision if directed by the Commission. However, it is the obligation of the solar
17 generation owner to prepare the spreadsheet including the forecast data that has been
18 provided to DESC ahead of the scheduled time of the energy delivery or use actual
19 meter data as the point of comparison on both the beginning and end of the one-
20 hour period. If requested, DESC could modify the SSVM spreadsheet to compare
21 each five-minute period to a forecast instead of the one hour “look back.” The

1 generation owner supplied forecasts would need to be entered on the SSVM
2 spreadsheet by the generation owner and would need to correlate to operational
3 forecasts previously provided to DESC. The generation owner also would still be
4 required to provide the actual five-minute meter data from the “SSVM meter” for
5 the SSVM calculation as stated in the Protocol. Along with adding a protocol
6 provision for a comparison to the forecasted schedule, DESC would require a
7 standard of forecast accuracy so a forecasting bias could not be used to “game” the
8 spreadsheet. Forecasting solar generation is a weather forecast problem, not a
9 spreadsheet problem. In the end, only an effective drop mitigation, a physical or
10 operational change, can alleviate the VIC, support reliability, and show
11 improvement on the SSVM calculation.

12 It also important to note that, with respect to Witness Burgess’s points about
13 changing the protocol for forecasting, absolute megawatts, and grouping sites,
14 DESC has already created an allowance in the existing version of the proposed
15 protocol. By providing for 100% VIC mitigation in the SSVM spreadsheet with
16 drops in output up to 25% (mitigating existing drops down to 25%, instead of zero
17 or near zero), DESC has already provided a level of tolerance for these events.
18 DESC recognized that individual sites may not need 100% mitigation for the system
19 to realize the benefits of mitigation and has accounted for that fact. Adopting
20 Witness Burgess’s proposal to create additional allowances risks adding provisions

1 to the protocol in the name of mitigation that do not actually alleviate the Company's
2 real need for additional reserves.

3
4 **Q. SHOULD DESC ALTER THE SSVM CRITERIA TO BE IN ABSOLUTE**
5 **MEGAWATTS INSTEAD OF A PERCENTAGE AS WITNESS BURGESS**
6 **SUGGESTS?**

7 A. No. The SSVM spreadsheet already addresses Witness Burgess's concerns
8 about morning and evening variability and intermittency, and the percentage is
9 consistent with the requirement for an additional 40% operating reserves. It is
10 important to note that the purpose of the Protocol is to validate measures taken to
11 reduce volatility and drops, and the protocol only validates successful mitigations.
12 If a drop is a small magnitude, a sizable energy storage system or other some other
13 successful mitigation should be able to reduce that small drop if it can successfully
14 mitigate the drops that test the SSVM. Said another way, if a measure can mitigate
15 the largest drops, it will most certainly mitigate the smaller drops that concern
16 Witness Burgess.

17 The SSVM spreadsheet is numerically fair and operationally practical in its
18 evaluation of the generator output. Morning and evening hours are already excluded
19 from the SSVM criteria. The spreadsheet already excluded data from the first two
20 hours and last two hours of the day. During the winter, the daylight production
21 period is only ten hours in duration and the SSVM spreadsheet is designed to

1 consider only the remaining six hours. This is completely fair and reasonable, and
2 any less duration would be impractical and unreasonable.

3 Finally, the SSVM spreadsheet already incorporates an allowance for the
4 absolute megawatt level of the drop. Along with other checks noted above, if the
5 drop is less than 10% of nameplate, that drop is tossed out of the comparison and
6 does not incur a penalty.

7
8 **Q. COULD DESC APPLY THE MITIGATION PROTOCOL TO A GROUP OF**
9 **GENERATION SITES?**

10 A. Yes. If the facilities are under contract with DESC by the same owner and
11 the owner provides the aggregated generation meter data and aggregated forecast
12 data in one properly completed SSVM spreadsheet each month, DESC could
13 evaluate all facilities covered in the spreadsheet as a whole for VIC mitigation.
14 However, aggregation does not solve any putative issues identified by Witness
15 Burgess because the Company already has incorporated the concept of self-
16 mitigation as a result of considering its entire fleet of generation assets in that
17 ensuring reliable operations requires considering and preparing for drops in
18 production. If mitigating drops as a group, the seller/owner is still responsible for
19 populating the SSVM spreadsheet with all required data and complete calculation,
20 and submitting that proof to DESC without any action required on the utility's part.

1 **Q. SHOULD DESC ADOPT THE MITIGATION PROTOCOL USED IN**
2 **NORTH CAROLINA AS WITNESS BURGESS SUGGESTS?**

3 A. No. Although the Company agrees in principle that a reduction in the average
4 volatility of variable generators indicates some type of improvement, it is not the
5 improvement that will save costs when considering additional reserves. Reducing
6 the average but not reducing the largest drops will still require the same level of
7 additional operating reserves. These large drops have been identified as the events
8 that require the additional reserves and are the drops that must be mitigated before
9 relief can be provided.

10
11 **RESPONSE TO TESTIMONY OF KENNETH SERCY**

12 **Q. WOULD ADDITIONAL ANALYSIS OR SUPPORT FOR THE**
13 **DEVELOPMENT OF THE PROPOSED TIME PERIODS PROVIDE A**
14 **BETTER OR MORE ACCURATE RATE?**

15 A. No. The hourly marginal costs used in the development of the pricing periods
16 are very well aligned with system costs. DESC has provided intervenors several
17 spreadsheets showing expected system marginal costs and containing over 87,000
18 hourly costs from each production cost run.

19 It is important to note that the heat map was not used by the Company to
20 define hours. Rather, the heat map is a Microsoft Excel feature that illustrates
21 differences in data on a spreadsheet. The conditional formatting provided by

1 Microsoft Excel is just a starting point and the average costs of different groups
2 were derived mathematically. Essentially, the heat maps provided a starting point
3 the development of groups that were adjusted in a logical manner for season and
4 hour of day to create a practical and useable rate schedule. The values that define
5 the rate profile were developed using the mathematical average of each group of
6 marginal costs and are not thumb rule estimates or approximations. In short, the map
7 is not the source of the Company's time period calculations but a simple
8 representation of the data entered into a spreadsheet and used to calculate those time
9 periods. Contrary to Witness Sercy's statement, the data in the heat maps is aligned
10 with system costs.

11 Understanding the purpose of this rate structure that varies with season and
12 time of day is essential to understanding why the heatmap is particularly well suited
13 to this analysis, why this visual representation is extremely useful, and a more
14 complicated mathematical derivation is not better. The Time-of-Production
15 ("TOP") Rate provides a guide or incentive to the QF generators with flexibility or
16 control over generator output. While TOP time periods are not as advantageous to
17 the system operator or customer as a real-time price signal, the TOP time periods
18 provide a reasonable and valuable alignment of flexible energy production to times
19 of higher energy value on the DESC system. Only providing a real-time price signal
20 to guide the generation operator could result in a meaningfully higher energy value
21 to DESC customers than the TOP regardless of the complexity of math used to

1 develop the time periods. Any adjustments, whether based on heatmaps or
2 mathematical analysis, can only add small increases in value, and even that is highly
3 dependent on the characteristics of the QF resource. In this context, I note that ORS
4 Witness Horii suggests a change to one of the PR-1 non-solar time period that is
5 reasonable and may add value for the system and some prospective generators;
6 DESC does not oppose that suggestion.

7 Most importantly, the heat maps apply only to the rate profile and do not
8 impact the accurately and deliberately calculated avoided costs that are derived
9 using the avoided cost methodology.
10

11 **Q. WHAT IS YOUR RESPONSE TO WITNESS SERCY'S STATEMENT THAT**
12 **THE HEAT MAP CONTAINS UNCLEAR AND INCONSISTENT**
13 **INSTANCES AND THAT HE IS UNABLE TO DETERMINE WHETHER**
14 **THE PERIODS ALIGN WITH THE COLOR PATTERN?**

15 **A.** I disagree. Witness Sercy should be able to perform any analysis that he
16 desires because DESC has provided the marginal cost data. This data can be
17 evaluated independently regardless of the presence of a heat map.
18

RESPONSE TO TESTIMONY OF BRIAN HORII

**Q. WHAT IS YOUR RESPONSE TO WITNESS HORII'S
RECOMMENDATIONS REGARDING THE FOUR TOP PERIODS?**

A. Although the Company believes that its calculations regarding the four PR-
1 non-solar time periods are reasonable and prudent, it does not oppose Witness
Horii's recommendations.

Q. DOES THIS CONCLUDE YOUR REBUTTAL TESTIMONY?

A. Yes.